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Chapter · July 2019

DOI: 10.1108/S0277-283320190000033005

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Ifeoma Ajunwa, Daniel Greene, *

CHAPTER 3

PLATFORMS AT WORK: AUTOMATED HIRING PLATFORMS AND OTHER NEW INTERMEDIARIES IN THE ORGANIZATION OF WORK

Ifeoma Ajunwa and Daniel Greene*

ABSTRACT

This chapter lays out a research agenda in the sociology of work for a type of data and organizational intermediary: work platforms. As an example, the authors employ a case study of the adoption of automated hiring platforms (AHPs) in which the authors distinguish between promises and existing practices. The authors draw on two main methods to do so: critical discourse analysis and affordance critique. The authors collected and examined a mix of trade, popular press, and corporate archives; 135 texts in total. The analysis reveals that work platforms offer five core affordances to management: (1) structured data fields optimized for capture and portability within organizations; (2) increased legibility of activity qua data captured inside and outside the workplace; (3) information asymmetry between labor and management; (4) an "ecosystem" design that supports the development of limited-use applications for specific domains; and (5) the standardization of managerial techniques between workplaces. These combine to create a managerial frame for workers as fungible human capital, available on demand and easily ported between job tasks and organizations. While outlining the origin of platform studies within media and communication studies, the authors demonstrate the

Work and Labor in the Digital Age
Research in the Sociology of Work, Volume 33, 61–91

ISSN: 0277-2833/doi:10.1108/S0277-283320190000033005

specific tools the sociology of work brings to the study of platforms within the workplace. The authors conclude by suggesting avenues for future sociological research not only on hiring platforms, but also on other work platforms such as those supporting automated scheduling and customer relationship management.

Keywords: Automation; hiring; algorithms; platform authoritarianism; design; brokers

INTRODUCTION

The sociology of work has long-linked analyses of macro-structural changes in labor markets, institutional norms, and corporate organization with workers' experience of the labor process, their investment in it, and their outcomes from it (Kalleberg, 1989). This has only become more of a challenge in the information economy, where work is increasingly organized by technological platforms whose logic is opaque to employees (Aneesh, 2009; Schor & Attwood-Charles, 2017). The reach of these work platforms exceeds the boundaries of individual organizations, linking contractors across continents or tracking employee data across other social spaces (Winter, Berente, Howison, & Butler, 2014). This restructuring of management through data relations begins even before the employee's first day of work.

Applying to work at a Target department store, for example, requires applicants to spend hours on an Automated Hiring Platform (AHP) submitting their work history, personally identifiable information, and scheduling availability; agreeing to background checks; and participating in lengthy personality and skills assessments, all quickly analyzed by the platform and processed for the hirer. The interface and analytics of the AHP is structured on Target's terms. Although the system is not designed by Target but by the data broker Equifax, best known as a consumer credit reporting agency (Marron, 2007), the software will process and sort applicants pursuant to the client's criteria. There is a preset menu of options for applicants to choose from at each point, adorned with the company's logo and colors. Even the rare open text field found on the work history page limits applicants to just 32 characters of description for each past job. We term the sociotechnical phenomenon presented by this platform structure, *platform authoritarianism* (Ajunwa, 2018): the platform restricts the actions available to workers on one side while offering new affordances to employers on the other. Employers gain penetrating new insights into current or potential employees, but the latter have no room to negotiate. Rather, job applicants must engage with the platform as dictated or lose the opportunity to work. Other major AHP vendors include Kronos, SnagAJob, and Recruit. Barber (2006) finds that these recruitment and screening tools are now used by nearly all Global 500 companies, with paper applications increasingly unavailable except as accommodations for a disability.

In this chapter, we put forth a research agenda for the study of work platforms such as these, using the conceptual and empirical tools of the sociology

of work to open a new path in the platform studies conversation that is presently dominated by media and communication studies. As an example of our proposed approach, we explore the adoption of AHPs in the 1990s and early 2000s as a case study.

What Are AHPs For?

By "platforms," we mean digital intermediaries that invite submission of data from one party through pre-set interfaces and structured protocols, process that data via proprietary algorithms, and deliver the sorted data to a second party. The *raison d'être* of platforms is data manipulability – data made more malleable through pre-set interfaces, which can be customized with applications built for that specific ecosystem. Platforms are developed by a third party and rhetorically appeal to the data submitter as neutral intermediary, but almost always have a financial relationship with the analyzing party that purchased the platform software or its analyses. "Platform studies" have largely developed within the academic fields of media, information, and communication studies, where rich analyses of social media platforms like Facebook, Twitter, and the like have explored the construction of these digital spaces, user activities on them, and the political economy of data within them. As the business model for these data intermediaries emerged first within the advertising-funded web services represented by social media (Srnicek, 2016), it is not surprising that the analytic tools addressing them developed within fields that have historically addressed the social impact of advertising-supported media.

Yet, platforms are not isolated to social media. Rather, we are in the thrall of a data-driven reorganization of the workplace that takes as its impetus, the "workforce science" derived from nineteenth-century Taylorism and twentieth-century Fordism (Ajunwa, Crawford, & Ford, 2016). Consider that automated hiring requires a platform; an intermediary, in the form of an AHP drawing on outside databases to screen applicants, deploying assessment tools honed through engagement with thousands of applicants in disparate settings. But there is a fundamental difference between Facebook's social media platform and Equifax's AHP. While social pressure or market concentration within the sector might make Facebook the most likely choice for certain online social activities, its use is still voluntary and user submission of data are not coerced. Not so for the jobseeker who *must* use an AHP to seek employment at Target or Walmart, the barista who *must* get her schedule from Kronos, or the marketer who *must* record her calls in Salesforce. At work, platforms represent a coercive force, even when such coercion is "gamified" and invites participation with rewards rather than overt punishment (Cohen, 2015). Recall that the true client for an AHP vendor is always the hiring company who dictates the end goals and often the process to accomplish them.

In this chapter, we describe how these social relations manifest in the design of AHPs and the promises that accompany them, demonstrating the importance of the sociology of work to investigations of what some have called "platform capitalism" (Srnicek, 2016) and outlining a research agenda for the study of work platforms.

We find that platforms offer five core affordances to management: (1) structured data fields optimized for capture and portability within organizations; (2) increased legibility of activity *qua* data captured inside and outside the workplace; (3) information asymmetry between labor and management; (4) an "ecosystem" design that supports the development of limited-use applications for specific domains; and (5) the standardization of managerial techniques between workplaces. These combine to create a managerial frame for workers as fungible human capital, available on demand and easily ported between job tasks and organizations.

In what follows, we explore the insights that platform studies offer the sociology of work regarding the circulation of data within platforms, as well as, the interventions the sociology of work can offer regarding how organizations structure the labor process and the role of organizational intermediaries. These insights are demonstrated through a case study: the history of automated hiring and its evolution into a platform service through the 1990s and into the 2000s. We conclude by returning to our primary contribution – the managerial affordances of work platforms – and draw on them to suggest avenues for future research.

LITERATURE REVIEW: THE SOCIOLOGY OF WORK MEETS PLATFORM STUDIES

Conceptual definitions of platforms and empirical methods to investigate them are most highly developed in communication and media studies, which have largely focused on social media. However, these tools are inadequate for the study of work platforms. The design of work platforms is straightforwardly grounded in hierarchical, profit-maximizing social relations that diverge from the assumptions (if not the operation) of public, networked, conversational, and democratic social relations embedded in the design of social media. The hierarchical social relations within work platforms differ qualitatively from those in social media, with fundamentally different avenues of coercion and consent, many native to the workplace, now digitally transformed, available within work platforms. Consequently, work platforms must be studied as the successor to technologies of control long analyzed in the sociology of work.

Platform Studies

Platform studies in other domains, such as communication and media studies, prove useful in articulating how platforms differ from other types of technology or software that may be used in the workplace. The "platform" label embraced by advertising-funded hosts of user-generated content, such as YouTube, Facebook, and Tumblr, develops from older definitions of the term – as computational infrastructure, architecture, or political position – and has come to mean a neutral intermediary advancing free expression, without the intermediary holding any liability for the content posted by third parties (Gillespie, 2010).[1] This is despite the fact that the promotion of certain user-generated content, the censorship of

others, and the filtering and ranking of content streams is the core commodity these services offer.

Exploring this complex interplay of content, intermediary, user, client, and software requires a complex set of conceptual and empirical tools. Van Dijck (2013) defines platforms as

> […] the providers of software, (sometimes) hardware, and services that help code social activities into a computation architecture; they process (meta)data through algorithms and formatted protocols before presenting their interpreted logic in the form of user-friendly interfaces with default settings that reflect the platform owner's strategic choices. (p. 29)

Van Dijck's definition is content-agnostic, though she largely limits her analyses to social media platforms. Srnicek (2016) draws on a wider network of political economy and labor studies scholarship to position platforms as economic intermediaries in a new phase of capitalism in which data are the primary commodity. He develops a flexible typology of platforms based on their revenue models. Advertising platforms such as Google provide free services to users, track them, and sell their data to advertisers. Cloud platforms such as Salesforce lease digital services (e.g., storage space and enterprise software) to businesses for use in their own operations. Industrial platforms such as GE integrate data-mining features into industrial production, turning fixed capital into leased services. Product platforms such as Rolls Royce use data-tracking to transform goods (e.g., aircraft engines) into subscription-based services. Lean platforms such as Uber develop software to outsource the operation of core business assets (e.g., cabs and their drivers) to third-party contractors.

Van Dijck's image of platforms is that of a net: free-flowing social activity is caught, sorted, and the results delivered to the other – paying – side. This model, as Srnicek notes, was first developed for advertising platforms in the early days of Web 2.0, and then generalized to other sectors. While Srnicek expands platform studies' scope to data commodification in a variety of domains, the field still lacks analyses of how platforms mediate employer–employee relations – necessitating a closer look at platforms through the sociology of work.

A Sociology of Platforms at Work

Connecting platforms to the sociology of work advances the literature on workplace technology, particularly in the context of control. Control, with or without technology's assistance, is established through different gradations and couplings of coercion and consent. As workers, we are forced to consent to the information asymmetries and command structures embedded in the workplace, because we must work to afford housing, food, etc. (Anderson, 2017). At work, employees face the possibility of managerial coercion through threats of firing or punitive adjustment to duties or schedules, should they not adjust their level of productivity or comportment to the needs of management (e.g., O'Connor, Kmec, & Harris, 2015; Sewell & Wilkinson, 1992). Complementing or substituting for these threats are relations of consent – carrot over stick. Employers and their representatives structure the labor process such that rewards, either material or

norm-based, are offered to workers, who must then decide whether the bargain is worth it (e.g., Hodson, 1999; Mears, 2015; Tuckman & Whittall, 2002).

New work technologies such as AHPs concretize social relations of coercion and consent at work, a phenomenon we term platform authoritarianism (Ajunwa, 2018). Edwards (1979) established the concept of technical control as a vehicle in line with simple and bureaucratic control. Technical control manifests most clearly in the assembly line, which binds workers to the rules embedded in the technology's function (Burawoy, 1983). Other technologies facilitate control, even if the technology is not itself the controlling factor. Stopwatches let managers time workers to set standards for control, scales weighed output to control workers through piece-rate pay, and punch card systems provided for greater of control of employees' time (Ajunwa, Crawford, & Schultz, 2017; Ball, 2010). Current technologies appear to rely more on consent. Health monitoring through wellness programs, for example, relies on the rewards promised to workers in meeting personal goals and lowering insurance premiums. But coercion still abounds (Ajunwa et al., 2017).

The sum of any combination of approaches to employee control through technology is a greater power to employers. Direct control over workers can be obtained through deskilling, while through consent, "freedom" is granted to workers who are already bound to the interests of their superiors such that the "freedom" may be used to advance those interests (Burawoy, 1983). Focusing on direct control, Richardson (1996) explained that technology at work cannot be thought of only in terms of its features or as some separate force, but that it must instead be characterized socially to accurately reflect the "transfer of power" it catalyzes.

In discussing the decline of labor unions, Richardson (1996) illustrated how the power transfer becomes amplified. Technology eliminates or deskills the trades that unionized and allows jobs to relocate or be conducted remotely to avoid unions entirely. Workers lose their power individually and collectively through technology's control. The disruption to the mutual reliance that once gave workers power with managers occurs at both levels, with once-skilled workers able to be replaced by anyone (or no one at all), and once-unionized jobs able to be performed anywhere.

Braverman's (1998) seminal analysis of technology, Taylorist management, and the labor process showed how managerial control is exerted through the analysis and restructuring of the division of labor. This restructuring often carries the threat of deskilling work tasks and removing labor's monopoly of control over the integrated process; "the brain moves up the chain" separating conception from execution. Key here are questions of skill and authority, and how the workspace – its tools, its timing – is constructed to enhance or detract from either. Platforms, as data intermediaries, can be used to automate these processes, creating new digital spaces to capture and analyze the data traces of employee actions, making them legible, fungible, and replicable (Aneesh, 2009).

Monitoring technologies work differently but have a similar effect on the power relationship between employers and workers. Despite challenging the critiques of workplace technology that present it as disempowering for workers,

MacLarkey (1997) conceded that phone line tapping, video monitoring, keystroke logging, document counting, and email reading had already become commonplace. Drug testing, GPS tracking, RFID tags, genetic testing, social media monitoring, random screenshots, "smart" badges, and various sensors in the workplace advance monitoring, sometimes in ways unknown to the worker (Ajunwa et al., 2017; Ball, 2010). Managerial control expands first through work intensification, as monitoring communicates that workers must be more productive, more efficient, and more sensitive to employer goals (Chesley, 2014). Then, surveillance creates a culture around what it communicates, giving norms, as a proxy for management, power over workers (Ball, 2010). Such norm-backed control, created through the use of surveillance systems, reveal the thin line between coercion and consent (Ajunwa et al., 2016; Burawoy, 1983; Burawoy & Wright, 1990). Ball (2010) reported reduced creativity under surveillance, and while not asserting that as an intended effect as much as negative consequence, work could easily be deskilled by purposefully limiting creativity through comprehensive monitoring.

While Burawoy (1983) suggested that bureaucratic rules replaced technical control in popularity after Second World War, a more recent history of technology through the sociology of work reveals that the bureaucratic rules are now embodied in workplace technologies, furthering the power swing. For example, the rise of electronic recruitment, as described by Ajunwa et al. (2017) and Ball (2010), takes inflexible rules once left to human application and brings them into an even more rigid, digital system of control. Likewise, the analytics that convert data into insights function on algorithms that are little more than a mystified version of the rules once designed to remove judgment in the name of standard procedure. The level of control, however, is increased, as the rules and their application become more opaque and embedded through layers of machine learning (Fourcade & Healy, 2017). However, humans still desire to match with an algorithm because of both the excitement of feeling understood and the disappointment of being left out (Fourcade & Healy, 2017). By motivating workers to tailor their behavior and attitude to the algorithm, rules control at an even deeper level than before.

Meanwhile, surveillance no longer only records facts, but makes determinations based on the rules, taking power from higher status workers (Fourcade & Healy, 2017). These determinations flow from measurement to rankings, which then turn into classes or categories, restarting the cycle. In this way, additional control is gained via workplace technology: it re-categorizes worker status, on behalf of management. New data, new forms of monitoring, new classifications and rules, and new ways of communicating them all combine to reduce worker power.

Within this history of technology tilting power out of workers' favor, platforms appear as the next logical step for research in the sociology of work. Srnicek's (2016) *Platform Capitalism* argues that the explosion of venture-funded platforms in the early twenty-first century would have been impossible without the stagnant real wages, insecure employment relations, and asset-price Keynesianism inherited from the late twentieth century (pp. 34–35). While he does not enter into dialog with her ideas, Srnicek's work can, from our position,

be read as an elaboration of Beverly Silver's (2003) immense body of research on capital's technological, organizational, and geographical responses to labor militancy and falling profit rates. We cannot overlook that the rise of the work platform is due, in part, to the technologies and political-economic conditions preceding platforms.

Schor and Attwood-Charles (2017) lay out an empirical agenda for research into the platform-based "sharing economy" that focuses on the extension and/or marketization of social relations through platform sharing, labor conditions within platforms like Uber, and the reproduction of existing inequalities through, for example, racial discrimination against black Airbnb renters. Some of these sites are work platforms as we understand them, others, like the home-rental service Airbnb are better understood as "capital platforms" facilitating asset leasing (Smith, 2016). Research into the "sharing" or "gig" economy like the above often uncovers the unequal power relations within them, counter to the platforms' promise of freedom and independence. What is important from our perspective is to view management–by–platform not as an experiment on a new breed of gig workers, but a general managerial strategy that manifests differently in restaurants, law firms, warehouses, etc.

Siciliano's (2016) ethnography of audience analytics work usefully demonstrates how platforms built as entertainment vehicles for consumers become, through the ecosystem that emerges from the revenue model, elaborate systems of control for workers. Design decisions in one part of the ecosystem cascade out to organize labor in another area. He shows that work platforms, because they are constantly updated through the cloud, are unstable means of both value production and worker control. We share Siciliano's belief that the sociology of work must extend its analyses outward beyond the organization and build on it in our analysis of automated hiring. However, we also suggest, empirically and in our proposed research agenda, a countervailing tendency to his argument that platforms' continual updates and ecosystem effects may destabilize intra-organizational managerial patterns. In some instances, we believe they will standardize managerial approaches across organizations. AHP vendors offered to standardize hiring practices across large chains' retail locations, for example, and pitched sector-specific solutions that standardized the data sources that pharmacies, for example, drew on to vet applicants. It is an empirical question as to which tendency holds in which setting.

Sharone's (2017) in-depth interviews with users of the business networking platform LinkedIn is, topically, quite close to our own interest in platforms governing entrance into employment relations, rather than conduct within the workplace. Particularly important are his insights into the social relations inherent in LinkedIn's interface, which place greater emphasis on physical appearance earlier in the job search process, penalize non-standard work histories, and force jobseekers to narrow their search to single sectors. That jobseekers must comply to LinkedIn's strictures is an example of platform authoritarianism. This suggests a fruitful avenue for future research: exploring how platform affordances shape the labor market signals of both hirers and jobseekers, creating new parameters for evaluation. There is a missing story, however, that may

be elucidated by other methodologies: LinkedIn does not just design a box for data freely submitted to them, they actively court the participation of large hirers and headhunters in service of their mission to create an "economic graph" of the global labor market. They are not just a piece of software, but an organization that shapes labor market signals to serve its ambitions. Platforms like LinkedIn must be investigated as active participants in the labor market, rather than neutral gateways. The organization, not just the people using its software, must be an object of inquiry.

In the next section, we expand on these existing analyses and provide an example for our research agenda for platforms at work with a history of AHPs, focusing on their patterns of sectoral adoption and their role as labor market intermediaries.

METHODOLOGY

To map the adoption and design of early AHPs, we parse what they were *for* (i.e., what promises they held for enterprises in the future) and what they *did* (i.e., how they re-structured existing hiring relations in the present). The two are not necessarily equivalent. Businesses may embrace a technology for one reason but use it for another. Distinguishing between future promises and existing practices required triangulating between different archival sources (Toubiana & Zietsma, 2017). We draw on two main methods to do so: critical discourse analysis (CDA) and affordance critique.

Content analysis is a more widely used technique for textual analysis within sociology and neighboring fields like political science, proceeding deductively from the generation of a code-set based in categories of interests or themes drawn from the literature, to the, often but not always, quantitative analysis of texts of interest for the presence of the pre-established codes (e.g., Gilens, 2009; Linneman, 2013; Saguy & Gruys, 2010). However, CDA is also used in sociological studies interested less in frequency or distribution of textual themes and more in the linguistic nuance of those themes and their interaction with other social practices (e.g., Conrad, 2006; Rohlinger, 2002). For example, Barnard-Wills' (2011) discourse analysis of UK newspapers mapped two competing frameworks for discussing state surveillance: as appropriate counter-terror measure or inappropriate, Big Brother privacy invasion. Some cultural sociologists also combine content analysis with CDA, using the former to examine the major grouping of themes across historical periods and different types of texts, and then using the latter to dig into a smaller subset of sources and describe how these themes play out in the texts and how they relate to broader social context (e.g., Johnston & Baumann, 2007; Smirnova, 2014).

We use CDA to map discussions of what AHPs are *for*. This is an inductive, qualitative method that explores how different parties describe and explain their social practices (Van Leeuwen, 2008). Thematic codes emerge from analysis, rather than prior to it, and are progressively refined. The texts we analyze provide a story for technological adoption, fitting new developments into existing

ideas about how firms can and should function, adjusting those ideas as needed. Fairclough (1992) locates the origin of CDA within a politically minded branch of linguistics. His approach brings together sociolinguistics' detailed textual analysis, Foucauldian critiques of macro-sociological social practice, and micro-sociological interpretive approaches to conversation analysis. Like Grounded Theory (Strauss & Corbin, 1990), CDA's inductive, context-sensitive methodology is also a critical-realist theory of social practice. CDA provides a set of tools for approaching discourse as a constitutive element of social practice, based on a set of assumptions of how meaning is made to matter in social life (Jørgensen & Phillips, 2002). Chiapello and Fairclough (2002) present CDA as a critical tool for the new sociology of capitalism; a method for an era where management demands discursive work from employees, and where consent is elicited through new ideologies of work as identity. In their mold, we find CDA useful for identifying distinct managerial discourses and specifying both their inner logic and their dialectical relationship to other organizational activities – here, the design of AHPs by vendors and their use by hirers.

We also find useful the related research in the sociology of work that conducts CDAs of texts such as newspapers (Styhre, Backman, & Börjesson, 2005), industry reports (Ness, 2012), and interview transcripts (Dick & Cassell, 2004) to examine the construction of workers' identities. Critically, such studies do not assume that such discourse creates the worker *ex nihilo*, but rather adopts a critical realist approach wherein identity discourses work within the constraints and opportunities afforded by organizational form. Closer to our object of study, Handley's CDA of UK employers' graduate careers websites (Handley, 2017) show how employers begin to manage workers' expectations of the job before they are even recruited. Like Handley, we explore management discourse that extends hierarchical labor relations beyond the firm and into the recruitment process, but we move beyond her work by studying recruitment technology and its designers as active agents in this process. We draw on prior work (e.g., Greene & Shilton, 2018) critically analyzing mobile developer discussions about "privacy," to understand how discursive practices influence technological design and vice versa.

We focus our discussion on technology and descriptions of it by examining AHPs' *affordances*. In its original usage in environmental psychology (Greeno, 1994), an affordance was a feature of the environment that offered an animal an opportunity for or constraint on action (e.g., a cave affords shelter) that varied depending on the characteristics of the species and their ability to perceive the affordance. Media and communication studies have developed the idea to focus on the relationship between design features, human perception of them, and the relationship between the two that defines what different users can or cannot do with a technology (Rice et al., 2017; Schrock, 2015). Sociologists and organizational scholars use affordances as a framework to study how technologies offer specific uses to users while denying others (e.g., Hutchby, 2001; Leonardi, 2011). MacKenzie, Marks, and Morgan (2017) analyzes interviews with older engineers to show how the changing affordances of telecommunications infrastructure – from analog to digital – made previous professional identities less accessible. Siciliano (2016) presages our work on platform affordances at the organizational

scale. His ethnography of analytics work demonstrates that "calculative cloud-based information and communication technologies" afford different actions for different parties: managers control the planning of analytics work, employees creatively reorganize data within the cloud, and vendors adjust the form and function of the software on the fly, frustrating both managers and workers. We build from his approach, paying careful attention to the different affordances AHPs offer vendors, hirers, and jobseekers.

Nagy and Neff's (2015) concept of "imagined affordances" helps us focus our CDA on the relationship between technical features and discourse about them. They return to environmental psychology's focus on the perception of environmental features, suggesting that while affordances and constraints impose material limits on human action, those limits are themselves the result of an ongoing, back-and-forth interaction with the expectations of designers and users. CDA helps us track how the expectations of designers and their clients are concretized in design, and how users' expectations for how the social world should work is enabled or frustrated by design. This interactionist approach has been frequently deployed in the study of technology, labor, and organizations, where researchers are interested in how discourse interacts with other organizational practices and structures (e.g., Chouliaraki & Fairclough, 2010). For example, Greene and Shilton (2018) analyze online discussion forums to show how mobile platforms structure developers' work practices and thus their operationalization of values like "privacy." Similarly, Liao (2015) demonstrates the dialectical relationship between firms' public-facing marketing discourse about augmented reality technologies and more-private design decisions.

Data Collection

Our inductive data collection and analysis began with an informal survey of current AHPs. We conducted an informal survey of the hiring websites for top-20 largest private employers in the US as ranked in the 2017 edition of the Fortune 500, screenshotting each stage of the application process, and making note of whether the firm required online applications (Appendix), and the features each site had in common. These included listings of available jobs, work histories, skills assessments, personality assessments, reference checks, background checks, scheduling tools, and measures to verify eligibility for work and employer tax credits. This, along with the names of current AHP vendors – available on the hiring websites above, often in an "About" page – provided us with keywords with which to query LexisNexis' newspaper and trade press database, alongside more general keywords such as "online job application," and "internet job search."

Historical studies of organizational, occupational, or technological change in a single sector often draw on a single archive, particularly trade journals (e.g., Arndt & Bigelow, 2005). AHPs, because of their nature as brokers sitting between different constituencies, bring together multiple sets of actors with distinct interests: jobseekers, enterprises, and designers. Because of this dynamic, and because of the need to distinguish between designers' and users' stories of adoption, we identified three distinct archives of interest: popular press coverage

of new technological trends in hiring and job-seeking, trade press coverage of enterprise AHP use, and materials from AHP manufacturers themselves. The latter included marketing materials, instructional materials, patents, and technical drawings.

Our informal survey corroborated Barber's (2006) finding that online submission of job search materials dominated the hiring practice of the largest global firms by 2006. Working backwards from there, we were initially interested in which types of organizations first used online hiring, when, and how. We narrowed our period of interest to 1990–2006, the period in which the Internet (first through bulletin board services and then the web) and thus online job search popularized. LexisNexis delivered results related to our search times in the popular press (e.g., *The New York Times* and *The Washington Post*) as well as the business and trade press (e.g., *The Portland Business Journal* and *Chain Leader*). Results that mentioned AHP features offhand (e.g., a general job search story in which online submission is incidental, or a stock listing for an AHP developer) were discarded. Names of vendors and technologies that appeared in that initial search were used to cast a wider net, frequently through the Internet Archive, to find online copies of marketing, instructional, and support materials that AHP vendors used to solicit or train clients.

Of particular interest was Unicru – founded as Decision Point systems in 1987 and purchased by workforce analytics firm Kronos in 2006. Inductive analysis revealed the difficulty of identifying "firsts" in online hiring, because different features were on offer at different times in different places. Instead what became clear to us, and ultimately the focus of this chapter, was that Unicru was the first firm to bring these different features together into one product that could be adjusted by different clients to fit their needs. That is, they became market leaders because they platformized hiring. Unicru's dominance of the trade and popular press coverage of automated hiring in our period of interest led us to focus further on their design and marketing materials.

Data Analysis

We collected and examined 135 archival texts in total, combining popular, trade, and corporate materials. We used them to build a timeline of AHP feature development, and to conduct a CDA of AHP rollout and reception. The timeline would go on to inform the high-level themes that emerged from CDA, helping us understand the relationship between discourse about what AHPs were *for* and their implementation on the ground.

Building a timeline of AHP feature development was relatively straightforward. AHPs did not emerge fully formed. Features (e.g., hyperlinked job openings and automated background checks) emerged in fits and starts before we saw fully formed online job applications in 2000 when Unicru ported their HirePro kiosk software to standalone websites built along client specifications. Features identified in one archival account would need to be corroborated by at least two other accounts, preferably from different publications, before we could confidentially assert that a feature emerged in a specific year.

The CDA of AHP rollout and reception required a closer, systemic reading of the claims that jobseekers, technologists, and enterprise clients were making about the design and use of hiring software. This method allowed us to explore the spirit of AHPs: the emergent story about their role in the hiring process and how they changed employers' and applicants' orientation to the labor market. Jobseekers were generally interviewed in the popular press, where technologists and enterprise clients (usually but not always executives who made procurement decisions) were generally interviewed in the trade press.

Following data collection, each author did a first pass on the entire collection to classify each text as either popular press article, trade literature, or industry materials. The three groups were then split in two for each author's analysis, with a code set developed collaboratively as texts were analyzed. Each author contributed to a shared feature timeline, and conducted CDA on their own materials. Importantly, coding the texts had to distinguish between who was making claims about AHP designs and functions, in order to compare sales pitches with more grounded journalism, and to compare the sorts of claims that could end up in design (e.g., client requests for faster resume processing) versus those that could not (e.g., applicant fears that no one would ever read their materials; an important social fact about implementation but not a sentiment with the power to influence design). The code set for archival materials included: year; state; archival category; economic sector; features described; AHP vendor mentioned, if a specific piece of software was mentioned; whether the party making a claim about AHP designs and functions was an applicant, AHP vendor, or client (and among clients, an executive, hiring manager, or human resources staffer); whether a text described current or potential features; and, eventually, a set of inductively generated themes addressing AHP drawbacks and benefits, for either applicants or hirers. The latter forms the basis of the Triangulating Claimed Benefits section. Each author spot-checked pieces of the other's collection to corroborate their annotations and the emergent themes drawn from those annotations.

FINDINGS

In this section, we track AHP affordances as they first emerged in the 1990s and 2000s, the political-economic context for their adoption, the growth of the businesses selling them, and reactions to them from hirers, applicants, and the press. This story about the progressive platformization of hiring is built from our empirical analysis of designers' and adopters' descriptions of these tools and their integration into labor–management relations. The main protagonist here is Unicru, the first and largest AHP vendor for the hourly workforce, who beat competitors to market, drove adoption by large employers, and developed the core platform features that we see in wider adoption today. We highlight throughout the affordances for automated hiring that emerged over time and, with an eye to the next section, begin to abstract them from the specific domain of hiring to the broader problem of management by platform.

Job Boards and Experimental Software: 1990–1993

The first major feature-set in the automated hiring space, appearing in the early 1990s, was job boards: simple postings of job openings, focused on salaried professionals, the people who had the skills and means to get online at the time. There were both local (e.g., LA Online) and national (e.g., ECHO) variants, as well as boards hosted on larger, pre-Web Bulletin Board Services like CompuServe and Prodigy (Bucy, 1991), all with the same fee-for-placement model as classified ads but with an added promise of disintermediation. Unlike a newspaper, hyperlinked job boards enabled direct submission to employers. Elsewhere, The Online Career Center charged applicants $6 to input a resume to their closed system. They told employers this system would sift through the unemployed masses generated by the early 1990s recession. Spinnaker Software Corp. and Data-Tech Distributors, Inc. sold CD-ROMs to jobseekers, preloaded with databases of employers and software to edit applicant materials and pre-fill forms for specific sectors, like the federal government (Matas, 1993). Here we see the beginning of structured data fields optimized for capture and portability within organizations. Compared to print classified ads that prompted phone calls or letters, hyperlinked job boards allowed for faster submission and capture of applicant materials. They also begin, through companies like Spinnaker, to move beyond shared cultural norms for resume structure and instead directly shape applicant data to the needs of the hirer – incipient platform authoritarianism.

The New Classified Sections: 1993–1996

With the opening of the web in the mid-1990s, start-ups began to do more than just digitize classified ads, two in particular: Monster.com (founded in 1994 as The Monster Board) and CareerBuilder (founded in 1995 as NetStart, renamed in 1996). Monster did not just post listings, they also allowed jobseekers to post résumés and charged employers for access to this database, which they could then search at will (Ceron, 2000). CareerBuilder went even further. For $2,000 per month, companies could post listings to CareerBuilder's database and review jobseekers' posted résumés. For a flat fee of $5,000, clients could purchase TeamBuilder software that allowed "non-technical" HR departments to design job listings that integrated seamlessly into their own website, and then create databases, scoring systems, and automatic forwarding trees (e.g., to specific hiring managers for specific listings) that helped store and sort resumes received (Chandrasekaran, 1996). CareerBuilder told potential investors this would cut hiring costs in half, expanding clients' applicant pool and reducing the time from first contact to offer (Selz, 1998). Humans still reviewed every step of this process, but their work was sped up, reorganized, and networked. And because résumés would be surfaced within databases through keyword searches, jobseekers had to ensure theirs was cleanly typed – and thus legible to optical character recognition – and so began to draw from an ever-changing set of industry keywords (Oram, 1997).

Structured data fields that shaped applicant data and directed it through the organization proliferated at this stage, but other affordances emerge too. The path

to platformization begins with projects like CareerBuilders': off-the-shelf software that can be customized by the client to fit their organizational structure and hiring needs. This is not the cloud-based platform of later years, where employers select from a vendor's menu and both can adjust the interface and analytics on the fly, but it begins the process. Further, the scoring systems on offer digitize paper-based version of the same. They do not yet automate assessment of applicants' qualities, but do sort and rank human hirers' assessments. This is thus an increasing formalization of the information asymmetry between hirers and jobseekers, an affordance that the platformization trend will only further develop.

Decision Point Systems and the Kiosk: 1997–2000

Up to this point, online job applications and software for automatically processing them had been focused on salaried, professional jobs – particularly in the technology sector. But then, as now, hourly workers make up the plurality of the US workforce. And turnover is higher in lower-wage retail or food service sectors than it is in other, higher-wage sectors. This presented a large, untapped market for interested firms, as well as distinct technological challenges. Automating hiring in retail meant, compared to early ventures in professional services, processing a much larger number of people for a given client, doing so quickly enough to accommodate seasonal hiring spikes, fitting them to more standardized positions, and assessing them for sector-specific qualities (e.g., availability for night shifts and propensity to shoplift).

Retail security firm Decision Point Systems recognized this opportunity in 1997. A major client had asked for assistance in evaluating applicants' risk for theft. Decision Point retooled their Multipoint document-scanning software as HirePro, an AHP accessed through kiosks installed in stores. HirePro combined a network of existing background check systems, into which applications would be automatically fed, with standard work history questions and personality questionnaires meant to "pinpoint personality traits and characteristics desirable for frontline retail jobs such as sales clerks and cashiers" (Rafter, 2005). Board member Brian Ascher said, "No one is doing a full-service offering ….There are little dot-coms that want to help you attract candidates, but they don't help you evaluate them" (Woodward, 2000). This the first real example of platformized hiring: not just automated but customized to the needs of individual enterprise clients, the software acting as a broker between applicant and hirer, its standards and filters adjusted remotely by the vendor.

Kiosks helped reach working-class jobseekers less likely to have home Internet access (McConnaughey, Lader, Chin, & Everette, 1998). A large department store would have two HirePro kiosks on the sales floor for applicant input and one in the manager's office where they would receive the system's output. They looked like large telephones, appearance customized to fit client branding, with a small screen and keyboard. Decision Point charged a small base fee for set up and a larger subscription fee based on clients' access to specific assessments, screening networks, and Decision Point's own analyses of employee data (Brenneman, 2000a; Rafter, 2005). The latter, according to Decision Point's home page in 2000,

helped clients "easily track turnover, applicant volume, and increases in sales …mak[ing] each location accountable for maintaining consistent hiring practices." The dispersed hiring practices of large chains were thus centralized by the platform: besides formalizing a set of procedures and goals across hiring units, HirePro would also route hires to locations besides the one to which they applied (Gilbertson, 1999).

Early AHPs requested work history, references, a personality questionnaire, and identifying information that would both verify eligibility for certain employer hiring tax credits and be fed into a subset of the 40 independent service providers with whom Decision Point contracted for sector-specific background checks. Everything was customizable. Good Guys electronics focused on drug and alcohol use in their assessment, whereas Target asked for reactions to employee theft or opinions on how many Americans cheated on their taxes (Richtel, 2000). Between 10 and 20 minutes after completion, the hiring manager at the location where an applicant applied would receive a three-page fax or email summarizing work history and other data before giving a color-coded rating of the applicant:

> The applications are labeled red zone (don't hire) and green zone (hire immediately). Yellow zone issues warnings, such as an applicant does not follow rules, may not be honest and could be argumentative with customers. (Brenneman, 2000a)

The HirePro report for hiring managers – called Profiler – suggested follow-up interview questions and areas of concern, based on jobseekers' responses to specific personality items or perhaps gaps in their work history.

The specific hiring needs of large retailers thus prompted the design of AHPs able to quickly assess applicants, speed-up and deskill the interview process, and centralize the assessment criteria and routing of applicants across retail locations. Affordances that emerged at earlier stages proliferate, while new ones appear. The sort of structured data fields that emerged at earlier stages of development were deployed across the application. Data fields soliciting applicants' work histories or their attitudes toward coworkers' behaviors could be adjusted based on the increasingly legible data of both employees within the organization (e.g., sales, schedules) and applicants outside it (e.g., a growing array of background checks). This widens an information asymmetry between hirers and applicants – the latter not only do not know the "right" answers in personality assessments but cannot see the network of background checks HirePro queries. All this is made possible by software that links individual kiosks across the client's locations, hosting an ecosystem of single-purpose applications (e.g., personality assessments and scheduling tools) that could be adjusted to client specifications, and connecting and standardizing hiring practices across locations.

Automated Hiring Becomes a Web Platform: 2000–2006

In 2000, Decision Point rebranded as Unicru "to forge its new identity as the one-stop site for job recruiting in malls, stores and online" (Brenneman, 2000b). Unicru already had kiosks in 4,000 stores in the US, around 12,000 individual

units, but the name signaled a grander vision for the company: Moving the entry point for automated hiring from kiosks to the web, making it a more iterative process that constantly analyzed new data from external databases and internal workforce analytics. This shift prioritized interoperability between Unicru's AHP and other systems that could measure clients' current employees to inform future hiring. This is what made HirePro a *platform*. This software-as-a-service model meant the AHP was more open to regular customization than a preloaded kiosk. It hosted other applications and constantly adjusted its features to manage the flow of data between clients, applicants, assessments, and screening networks. In the summer of 2003, for example, Unicru announced partnerships with TimeManagement Corporation to integrate Unicru's hiring analytics with their restaurant chain scheduling software, and ChoicePoint, to implement pharmacy-specific background checks. Most of these screening networks and analytics tools are of course beyond the view of the applicant, increasing the information asymmetry between them and the hirer.

By integrating themselves further into clients' existing operations and using more and more measures on potential employees, Unicru began to accumulate an enormous amount of data. These data were not sold to advertisers, as in the social media platform model. Instead, Unicru recruited experts in industrial and personality psychology and machine learning to develop applicant assessments based on the performance of clients' current employees. Unicru's chief scientist David Scarborough promised that "Our system allows you to clone your best, most reliable people" (Overholt, 2002). He led the rollout for the 50-item Frontline Reliability Assessment, a revamped personality assessment drawn from "the actual job results of 370,000 hourly workers in industries such as retail, grocery stores, and food service" (Frauenheim, 2006). Here we see the affordances that emerged previously expand, providing more possible actions for the hirer across two dimensions. The platform's reach is more extensive; with the move online networking various features together more quickly and allowing them to be adjusted and updated on the fly. And the platform's reach is more intensive; acquiring more and more data sources to examine the applicant and their potential fit with specific organizational roles.

Competitors such as Recruitmax and Kenexa attempted to beat Unicru into new sectors, but largely failed because Unicru already owned the largest slice of employers – hourly retail and food service – and had used that revenue to build up the data, research staff, and technology to refine their product for use elsewhere (Rafter, 2005). In 2006, they were acquired for $177.8 million by "human capital management" firm Kronos, a leader in workforce analytics whose business began with automated timeclocks workers could not cheat. Kronos' financial statements frame the intensive and extensive reach of Unicru's hiring platform as the perfect complement to Kronos' existing workforce analytics. Unicru, renamed Kronos Workforce Acquisitions, would form the basis of their new "talent management division" that "integrates with Kronos' workforce management products to link sourcing, selection and hiring strategy with actual performance and labor planning" (Kronos Incorporated, 2006, F-24).

The goal was to offer clients one platform that included automated hiring but much more:

> This integrated solution is designed to enable companies to cast a wider net for applicants, select in people who fit well and have higher potential, select out people who fit poorly or present risk, onboard and screen quickly, measure results and validate effectiveness, thereby driving top- and bottom-line business results by continuously improving the quality and productivity of their workforce. (p. 6)

This imagines a seamless flow of employee data from the time they become interested in the firm to the time they leave it, with entrance and exit channeled through a platform that disaggregates employees into the skills and dispositions needed for a specific location of a specific clients' business at a specific time.

Triangulating Claimed Benefits

In the previous section, we reviewed the affordances that emerged over time as the hiring process was platformized, primarily by Unicru. We believe these affordances generalize to other work platforms in domains besides hiring, and explore that further in the Conclusion. In this section, we draw further on our CDA to examine how these technical affordances appealed to hirers in the 1990s and 2000s – what benefits AHPs brought to personnel selection. In the process, we generalize from specific features and adoption claims to bigger trends in how AHPs broker the relationship between management and applicant. We identified four primary benefits, claimed by both AHP designers like Unicru and their clients: loss prevention, reduced bias in hiring, reduced time spent hiring, and increased retention rates. The master theme is of the reduction of *friction* in the labor market, by *fragmenting* workers into discrete skills and dispositions. By reading the claims of AHP designers against descriptions of design and use, we pinpointed gaps between promises about designs and their implementation, showing how discourse about the potential power of AHPs relates to their on-the-ground design and use.

Loss Prevention

Reducing theft of stock is a major concern for retailers. AHP vendors promised that more precise employee selection would assist loss prevention in two ways. First, vendors promised to reduce theft by eliminating from the applicant pool anyone convicted of shoplifting or similar crimes, or who had previously been fired from a similar job for theft, even if they were not charged. The former would draw from arrest and conviction records, while the latter would draw from employee records shared among industry partners. For example, Unicru's partnership with data broker ChoicePoint included access to four distinct databases potentially available to pharmacy clients: Esteem®, the ChoicePoint National Criminal File, the Health and Human Services List of Excluded Individuals, and County Criminal Check (Unicru, 2003). Second, automated psychological assessments promised to weed out applicants with thieving tendencies, even if they had never stolen or been accused by an employer of doing so. For example, Unicru

built a "dependability assessment" for Universal Studios Hollywood that would "rule out individuals inclined to steal or skip work" (Rafter, 2005).

This benefit emerges from multiple interacting affordances. Increased legibility of employee behavior as data allows Unicru to model "dependability" and test for it in applicants, and it allows data brokers such as ChoicePoint to sell to Unicru lists of names that should be excluded. This massive information asymmetry appeals to hirers: they have a network of resources to define "fit" in applicants who is not reciprocated in the other direction. Finally, this system is customizable for different clients or sectors.

Reduced Hiring Bias

AHP designers and clients also claim that automation reduces hirer bias, replacing messy human decisions with a neutral technical process, for example, "From a diversity perspective, artificial intelligence can be very beneficial because it's blind to things like color, age, sexual orientation" (Meredith, 2001).

But, algorithmic specification of "fit" can itself become a vehicle for bias. Unicru's instruction manuals for clients makes clear that the offer to "clone your best people" (Overholt, 2002) begins with the identification of existing high-sales employees within client records. The process is certainly more data-driven than most human hiring and provides a consistent, empirically driven standard arising out of a firm's operations – an attractive prospect for any hirer. But both computer science and anti-discrimination law scholarship identifies a "garbage in, garbage out" problem (Barocas & Selbst, 2016) wherein systemically biased data sources produce systemically biased analyses, regardless of the quality of those analyses. An extreme example: If stores were not hiring women before they began using Unicru, or only giving female employees low-traffic sales shifts, then that training data would lead Unicru's model to identify more men as ideal candidates. The prospect of "cloning your best people" comes from both the increased legibility of work activity as data – used to inform applicant assessments – and the centralization and standardization of hiring criteria – local managers have their actions constrained by a platform implemented at the corporate level.

Reduced Hiring Time

Those same affordances, plus the proliferation of structured, applicant-side data fields that capture specific data of interest to hirers (e.g., skills assessments and scheduling availability), promise clients a reduction in time spent hiring. What Unicru's training brochures called "faster associate capture" occurs through four principle means: (1) applicants enter data that would have otherwise been entered by hirers, (2) the first round of vetting is fully automated, occurring within minutes, (3) subsequent rounds of vetting are de-skilled, with interview guides produced for hiring managers, and (4) applicants are routed to branches where they're most needed, instead of having paper applications filed away where they applied. This features strongly in client testimonials in high-turnover sectors like retail and food service (e.g., Overholt, 2002).

This reduction in time spent hiring points to a key contradiction: Unicru was never fully automating hiring, despite their promises to the contrary. They were automating *rejection* by culling the bottom 20% or so of applicants – the red lights – from the pool before passing them onto hiring managers.[2] Human managers remain in the loop but lose some of their local discretion. Variables of interest are determined by corporate headquarters who purchase and implement the AHP. The direction of interviews is shaped by how the platform solicits, records, and presents applicant data, and then by its interview guides.

Increased Retention

Unicru commonly claimed – referring to their own private data – that they reduced clients' turnover rates 20–30% in the first year of adoption by highlighting for clients the best fits for open positions – those more likely to thrive in their duties and less likely to quit. Rock Bottom Restaurants' said their $400,000 investment in Unicru's AHP delivered a 21% reduction in turnover from 2002 to 2003, with one general manager saying, "There is no unnecessary interviewing" (Crecca, 2004). The promise is one of transparency and predictability. The AHP is supposed to help define exactly what clients want from a hire, by analyzing existing employee performance data garnered through point-of-sale systems, performance reviews, etc. There are then, ideally, no surprises. The right types are fitted to the right tasks.

Relatedly, vendors promised to quickly process applicants in periods of high need and, especially after the move to the web and the embrace of machine learning techniques, to analyze clients' existing sales data to predict new needs of which the client might not be aware. By linking Unicru's hiring analytics with Kronos' deep trove of workforce analytics, Kronos Incorporated (2006) promised to "integrate employee selection strategy with actual labor performance, link labor planning with sourcing and hiring" (p. 8). This is a vision for on-demand labor that precedes the app-based gig economy by several years and vastly exceeds it in scope, given the wide application of Kronos' software across sectors. That vision offered to corporate clients is grounded in concrete affordances: the increased legibility of employee data that informs hiring analytics, the structured data fields that measure applicant "fit," an ecosystem design that affords different measurements of fit for different sectors, and the increased information asymmetry that intensively measures whether and where applicants might fit – a viewpoint that is of course not reciprocated.

Reducing Friction, Increasing Fragmentation

The four major claimed benefits of AHPs – loss prevention, reduced bias in hiring, reduced time spent hiring, and increased retention rates – can be summarized as a reduction of friction in the labor market and the increased fragmentation of jobseekers into discrete bundles of skills and dispositions, that is, "human capital" (Adamson, 2009). Each of these benefits depends on the other, and they rely on different combinations of the affordances reviewed in

the previous section. The platformization of hiring, embodied by Unicru and its integration with Kronos, is the story of an emergent broker in the hiring ecosystem, building an infrastructure for sorting out employee qualities and directing them to hirers in the desired quantity. Increasing fragmentation to reduce friction shifts the object of interest from the whole worker to specific attitudes, behaviors, and capacities. Unicru's *Fast Company* profile captures this well: Blockbuster employee photos were overlaid with white text reading, for example, "T or F: I pay close attention when people talk to me." The jobseeker's self-presentation is restricted, dictated, and reprocessed in ways that are unknown and non-negotiable to the jobseeker.

It is this breaking down of jobseekers into fungible parts that allows for the smooth transition of those jobseekers from applying to interviewing to scheduling to managing, because once the data profile has been built, it can be moved along and scrutinized in different ways at different stages. What is reduced is not just the time spent at any given stage but barriers to interoperability between stages. To increase fragmentation and reduce friction, AHPs offer an enormous amount of freedom to hirers. Affordances are customizable. The content of specific assessments or background checks are adjusted either by request or in response to new trends in employee and sales data. The extensive reach of the platform grows and its insight into the applicant's qualities intensifies. But this same freedom for the hirer is not offered to the applicant, who must play catch-up with each new technical feature of the hiring process and who cannot even see many of the measures being deployed against them. The jobseeker is coerced into this opaque and non-negotiable process of AHPs, since workers must attain employment to afford basic needs such as food and housing; thereby subjecting the jobseeker to power disparities between themselves and the hirer that are created by information asymmetries embedded in AHPs. This is platform authoritarianism (Ajunwa, 2018) and to conclude we suggest alternative domains in which to study it, and possible methods to do so.

CONCLUSION AND FUTURE RESEARCH DIRECTIONS

AHPs are intermediaries. They restructure the flow of information within the labor market so that employers can select precisely the quantity and quality of employees they need exactly when and where they are needed. Or, more accurately, to reject applicants who do not fit those needs. Jobseekers' self-presentation is limited, channeled, and re-processed by this new broker for labor market signals. Platforms are distinct from other, previous workplace information technologies in their role as intermediaries implemented in similar fashion across different organizations and workplaces and in their constant, cloud-based connections to their designers – affording persistent adjustment and data analysis. Workplace platforms are distinct from social media platforms, the predominant object of study in platform studies, because of the coercive nature of their data flows and the high consequences that accompany their use in this domain.

Our analysis of AHPs suggests five core affordances which work platforms offer employers:

(1) structured data fields optimized for capture and portability within the organization;
(2) increased legibility of activity *qua* data collected inside and outside the organization;
(3) information asymmetry between labor and management inside and outside the organization;
(4) an "ecosystem" design supporting the development of limited-use, domain-specific applications; and
(5) the standardization of managerial techniques across workplaces within large organizations as well as between organizations.

Some work platforms will emphasize some of these over others. In the context of hiring, these affordances bore four core benefits to employers: loss prevention, reduced hiring bias, reduced time spent hiring, and increased retention. These come together in an overarching sociotechnical tendency to approach workers as human capital, able to be ported smoothly between tasks and locations. These affordances may bear different benefits when applied to different workplace functions (e.g., hiring and scheduling) or different parts of a firm (e.g., public relations and human resources).

These five core affordances that are offered to employers via work platforms are important avenues for future research because they differ qualitatively from the focus of the previous investigation that has dominated platform research and methodology. Historically, platform studies and methods of investigation have been largely conducted by communications and media studies focused on social media. However, the design of social media is grounded in public, non-coerced social relations, while work platforms are designed around hierarchy and profit maximization. Thus, the methods of study that have been previously utilized by communications and media studies to investigate social media platforms are not adequate to study work platforms given the divergence in design and coercion. The emergence of work platforms, these new technologies of control, are grounds for future research in the sociology of work. To suggest future avenues of research, we match different, contemporary work platform vendors to these functions and firm locations (Table 1).

The primary benefit of approaching these technologies from the sociology of work is to examine how social conflicts that dictate the terms of entry into, life within, or exit from the workplace or are built into, diffused by, or decided by platforms. Where Srnicek (2016) focuses on revenue models, our initial typology of managerial affordances focuses on the technological content of labor-capital conflicts within and around the workplace. Power contests which might otherwise be up for debate are rendered settled matters by technology and its constraining functions, with the obscured reality that the power has been tilted in one direction – in this case, in the direction of the employer.

Table 1. Contemporary Work Platform Vendors, Their Functions and Firm Locations.

Business Activities	HR Functions	Managerial Functions	Publicity Functions
Recruitment	LinkedIn		LinkedIn
Hiring/onboarding	Sapling, SnagAJob		
Time-keeping		Kronos	
Surveillance		Veriato 360, SpectorSoft, Sapience	
Scheduling	Kronos	Sling	
Internal communications		Slack, Workplace, Facebook	
External communications		SalesForce	Twitter, Facebook
Evaluation	SalesForce, Sapience		
Termination/off-boarding	Integrify	Kronos	

The stakes are even higher here than for other workplace technologies, whose capabilities might not change much after purchase. Given platforms' software as a service business model, which implies cloud connections, constant updates, and a broad swathe of enterprise customers, that power imbalance can grow over time as more employee data are absorbed, more firms and sectors are brought into the platforms' reach, and new analyses of employees and firms emerge from the vendor. As a broker between current or future employees and employers, work platforms would seem, at first glance, to be mere information intermediaries facilitating freely adopted employment relations. But there is of course only one paying customer for a Unicru or a Kronos and it isn't the employee. The information asymmetry work platforms grow between employers and employees is part of the pitch. Platforms' appeal to employers is their ability to disaggregate workers into skills and dispositions and then sort and direct that human capital on demand. They take workers apart and put them back together again, with the precise recipe updated as needed.

In this chapter, we have formulated a research agenda that interrogates the role of an emerging technology, platforms, in the workplace. How might the sociology of work develop and pursue that research agenda?

Future Research Directions

Importantly, our CDA of automated hiring does not get at the use of these technologies on the ground and how designs may be frustrated or transformed by different organizational contexts or worker adaptations. It is only a study of a single platform type, its adoption, and early design. Other work platforms may reveal different managerial affordances and different outcomes owed to different sorts of workforces, regulatory environments, and labor processes. The study of work platforms such as AHPs could offer greater insight into core sociological concepts such as "social capital" (e.g., Fernandez, Castilla, & Moore, 2000). Two future empirical directions are important to this topic.

First, interviewing human resource professionals about their use of AHPs (e.g., McDonald, Damarin, Lawhorne, & Wilcox, 2019), or participation-observation

that monitored that use (e.g., Anteby & Beckhy, 2016), would lend greater clarity to the distinction we draw between automated rejection and automated hiring and the broader impact of computerized assistance on hiring decisions. Do hirers understand AHPs as empirical prompts to balance human biases? As rhetorical cover for pre-rendered decisions? As trusted seers who override human decisions? AHP designers clearly advertise their technology as the third, and occasionally the first, but it is ultimately an empirical question. Researchers could also explore the operation of these technologies through a digital ethnography (e.g., Ziewitz, 2016).

Second, studying applicants' collective efforts to cheat these automated intermediaries would help us understand how new information asymmetries affect jobseekers' self-presentation within the labor market; building from the sociology of work's long history of studying worker resistance (e.g., Anteby, 2016). We are currently engaged in preliminary research in this vein, conducting discourse analyses of forums wherein jobseekers conduct amateur audits of AHPs, sharing responses to and results from personality questionnaires and background checks. These collective efforts to uncover chain- or vendor-specific automated hiring logics are, in many ways, ahead of academic researchers – although platform audit studies are an emergent methodology (e.g., Hannák et al., 2017), inspired by past sociological audit studies of, for example, housing discrimination.

Two other domains appear ripe for inquiry: automated scheduling and customer relationship management (CRM). Automated scheduling platforms are especially prevalent in retail and food service. They integrate with sales data to predict staffing needs over the course of a year, a week, or a day. Individual shifts are then broken up into increments as small as single hours. Employee schedules become extremely unpredictable from week to week, with some firms expecting employees to remain on call in periods of uncertain demand (Greenhouse, 2012; Scheiber, 2015). Kronos' ability to integrate scheduling analytics with hiring data, sales data, and a cross-location view of a firm's operations makes it a major player here. As with Unicru's original hiring platform, this is not full automation, but an expanded and systematized view of the process offered to local management, who "are often compensated based on the efficiency of their staffing" (Kantor, 2014).

Worker surveys could classify scheduling patterns by sector, and their costs (e.g., missed parenting time and longer commutes) by worker demographics. A digital ethnography of the software itself, coupled either with participant-observation of workplaces governed by these systems or in-depth interviews with affected workers, could explore how these technological practices affect job performance and work culture. Ideally, these are comparative projects. It may be that software developed for certain large employers (e.g., Walmart) or certain sectors (e.g., food service) then spreads to organizations where the scheduling needs are fundamentally different, because they are all served by the same vendor or because they admire the success of early adopters.

CRM platforms systematize sales teams' relationship with current and potential clients, recording data to generate new insights but also restructuring the contact process so that incidents (e.g., shortages and delinquent accounts) are

either responded to automatically or routed to relevant staff as they happen. Cloud-based SalesForce is the leader in this sector (Hardy, 2013; Rivlin, 2007). Their software creates a unified view of individual client cases across a firm. Customers gain an automated help desk to query the firm for specific orders or questions. Managers can see every interaction recorded within the environment. CRM platforms surface trends in employee and customer behavior for clients and update the software on the fly. Smaller app developers offer new features that plug into the ecosystem. RingDNA, for example, integrates telephony into SalesForce, allowing managers to record calls and oversee their staff's customer interactions.

Single-site ethnographies like Siciliano's (2016) are one route of investigation here. Salesforce is certainly a cloud-based, calculative information technology that facilitates a deep managerial view into sales staff's practices and knowledge. Whether staff fully consent to this deep managerial view is an empirical question. Recording more of their customer interactions may give up more of their hard-won knowledge, making them more expendable. A major challenge for researching CRM software, however, is capturing its inter-organizational effects. A fuller qualitative investigation would need to compare implementation and usage between organizations, as in Barley's (1986) study of hospital CT scanners, and the effect on workplace hierarchy and intra-organizational cooperation. Barley's CT scanners, however, could not be remotely updated, patched, and augmented by the platform provider and subsidiary services. Different organizations may embrace this interactivity in different ways.

Each of these domains – hiring, scheduling, CRM – offers its own challenges of study. Each domain is transformed by the platforms' role as data intermediaries, making more worker activity legible as data and widening information asymmetries between employers and employees. The sociology of work can, by drawing on its traditional methodological strengths and embracing new conceptual avenues, map this technological terrain and the social relations within it. This is a crucial step in creating more humane platforms and workplaces.

NOTES

*. The authors contributed equally to this chapter.

1. See also, Section 230 of the Community Decency Act.

2. Many thanks to Miranda Bogen of Upturn for surfacing this insight during a workshop at Data & Society.

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APPENDIX: APPLICATION POLICIES FOR THE 2017 FORTUNE 500 LIST OF TOP 20 EMPLOYERS IN THE US

Employer	Total Workforce	Online-only Application System?	Comments
Walmart	2.3 million	Yes	From their application FAQs: "We do not accept paper applications for hourly positions. We would recommend checking for computer access at your local library or workforce solution center."
Kroger	443,000	Yes	
IBM	420,000	Yes	
Home Depot	406,000	Yes	Helpline representative: "We do not offer paper job applications. All applications are required to be submitted online."
McDonald's	375,000	Yes, but individual franchises may elect for separate policies	
Berkshire Hathaway	367,700	Yes, but subsidiaries may elect for separate policies	
Amazon	341,400	Yes	
FedEx	335,800	Yes	
UPS	335,500	Yes	From the FAQs: "The process for external candidates must be done in UPSjobs.com."
Target	323,000	Yes	
Walgreens Boots Alliance	300,000	Yes	
General Electric	295,000	Yes	
Albertsons Co.	274,000	Yes	
Wells Fargo	269,100	Yes	From their guide to the application process: "The application process: – Fill out and submit the application. – You will receive an email confirmation that we have received it. – The recruiter or hiring manager will review your profile. – We will contact you directly if your background matches our hiring needs."
AT&T	268,500	Yes	
PepsiCo	264,000	Yes	
Cognizant Technology Solutions	260,200	Yes	
Starbucks	254,000	Yes	
JP Morgan Chase	243,400	Yes	

(*Continued*)

Employer	Total Workforce	Online-only Application System?	Comments
Lowe's	240,000	Yes	From their Careers FAQ: "To apply for a job with Lowe's, please follow these steps: – Search for jobs on careers.Lowes.com and click "Apply Now – Create your profile / account (an email address is required) – Complete the application."

Employer workforce data from 2017 Fortune 500 list of largest employers, excluding Yum China Holdings, who are based in TX but whose workforce is almost entirely in China. This should be taken as a "best estimate available" since some of the numbers include non-US employees (e.g., through other sources, we have found that Walmart's US workforce is closer to 1.4m).

Assessment of whether applications were online-only drawn from analysis of employer websites and, if that was inconclusive, correspondence with their human resource departments. To comply with the ADA, each company MAY offer printed applications as a reasonable accommodation to disabled applicants, depending on the nature of the disability and the request. This research was done on the basis of able-bodied applicants, with conclusions drawn from posted policies and phone and online chats with company representatives.